

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Niranjan Damera-Venkata Art Unit : 2625
Serial No. : 10/698,895 Examiner : Vo, Quang N
Filed : Oct. 31, 2003 Confirmation No.: 2961
Title : ERROR DIFFUSION HALFTONING WITH BANDPASS NOISE SHAPING

Commissioner for Patents
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REPLY BRIEF

I. Introduction

Claims 1-25, which are the subject of this appeal, are pending.

In the Answer, the Examiner has changed the grounds of rejection and now claims 3, 4, 8, 10, 11, 17, 18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 1-2, 6-7, 9, 13-14, 21, 23 and 25 are rejected under 35 U.S.C. § 102(b) over Kumar ("On the Phase Response of the Error Diffusion Filter for Image Half toning").

Claims 5, 12, 15-16, 19-20, 22 and 24 are rejected under 35 U.S.C. § 103(a) over Kumar ("On the Phase Response of the Error Diffusion Filter for Image Half toning") in view of Shimizu (U.S. 6,999,201).

II. Claim rejections under 35 U.S.C. § 102(b)

Claims 1, 2, 6, 7, 9, 13, 14, 21, 23, and 25 are rejected under 35 U.S.C. § 102(b) over Kumar ("On the Phase Response of the Error Diffusion Filter for Image Half toning").

A. Claim 1

The rejection of independent claim 1 is premised on the Examiner's assertion that that Kumar discloses "processing the output through a data processing path having a bandpass

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transfer characteristic" in the error filter h4 defined in example 2 on page 1287, in FIG. 1, and in the third paragraph on page 1285 (see page 3 of the final Office action). In the Appeal Brief (see pages 5-7), Appellants explained that, contrary to the Examiner's assertion, the error filter h4 defined in example 2 on page 1287, in FIG. 1, and in the third paragraph on page 1285 does not have a bandpass transfer characteristic. In particular, in each section of Kumar's disclosed that the Examiner cited in support of his assertion, Kumar expressly discloses that

The Examiner has replied to this explanation as follows (see page 13 of the Answer: original emphasis):

In response: Kumar discloses processing the output through a data processing path having a bandpass transfer characteristic (e.g., (e.g., error filter h4 which result in $1-H(w_x, w_y)$ having prominent bandpass shape at horizontal and vertical frequencies, page 1287. Note: Examiner has typo error for missing "which result in $1-H(w_x, w_y)$ " on page 1287 on the right column under figure 8, as cited in claim 1 of the Office Action on July 30, 2009).

This reply does not respond to Appellant's explanation that when the magnitude response of $1-H(w_x, w_y)$ has "prominent bandpass shape at horizontal and vertical frequencies," the magnitude response of the error filter h4 (i.e., the error filter in the data processing path, as shown in FIGS. 1 and 2 of Kumar) necessarily must have highpass and lowpass shapes at horizontal and vertical frequencies in order to have an inverse (i.e., $1-H(w_x, w_y)$) with a bandpass magnitude response. The Examiner repeatedly has failed to respond to this point. The fact is that Kumar consistently labels the error filters in the data process path with a lower case "h." The magnitude response of the error filter is denoted with a capital "H." Therefore, " $1-H(w_x, w_y)$ " necessarily must denote the magnitude response of the inverse of the error filter (i.e., $1-h$). The inverse of the error filter (i.e., $1-h$), however, is not in the data processing path of Kumar's error diffusion system; instead, the error filter h is in the data process path of Kumar's error diffusion system (see FIGS. 1 and 2). Thus, the Examiner's rejection of claim 1 is premised on the incorrect assumption that the bandpass magnitude response of the inverse filter $1-h$ describes the response of the error filter h. As is well-known in the art the error filter h necessarily must have a highpass and a lowpass magnitude response in order to produce an inverse filter with a bandpass magnitude response.

For at least this reason and the reasons explained on pages 5-7 of the Appeal Brief, the rejection of claim 1 under 35 U.S.C. § 102(b) over Kumar should be withdrawn.

B. Claims 2, 6, 7, 9, 13, 14, 21, 23, and 25

Each of claims 2, 6, 7, 9, 13, 14, 21, 23, and 25 is patentable over Kumar for at least the same reasons explained above in connection with independent claim 1 and on pages 7-8 of the Appeal Brief.

III. Claim rejections under 35 U.S.C. § 103(a)

The Examiner has rejected claims 5, 12, 15, 16, 19-20, 22, and 24 under 35 U.S.C. § 103(a) over Kumar ("On the Phase Response of the Error Diffusion Filter for Image Half toning") in view of Shimizu (U.S. 6,999,201).

A. Claims 5 and 22

Each of claims 5 and 22 incorporates the elements of independent claim 1. Shimizu does not make-up for the failure of Kumar to disclose or suggest the pertinent elements of independent claim 1 discussed above. Therefore, claims 5 and 22 are patentable over Kumar in view of Shimizu for at least the same reasons explained above in connection with independent claim 1 and on pages 5-7 of the Appeal Brief.

On pages 12-14 of the Appeal Brief, Appellants explained that claim 22 also is patentable over Kumar in view of Shimizu because (i) the Examiner's has failed to establish a *pima facie* case that Kumar in view of Shimizu discloses all the elements of claim 22, and (ii) Kumar in view in Shimizu does not disclose or suggest filtering with first and second low-pass filter transfer functions as defined in claim 22. Instead, of attempting to reply to these points the Examiner simply copied verbatim the same rationale given in the Office action dated July 30, 2009.

The Examiner's rejection of claim 22 is premised on his assertion that Kumar discloses a bandpass error filter (see the rationale given by the Examiner in support of claim 1) and that Shimizu discloses a low-pass filter. As explained on pages 12-14 of the Appeal Brief, such a position does not show that Kumar in view of Shimizu discloses or suggests a first low-pass filter function and a second low-pass filter transfer function, as recited in claim

22. Therefore, the rationale given by the Examiner in support of the rejection of claim 1 does not establish a *prima facie* case of obviousness.

Furthermore, Kumar in view in Shimizu does not disclose or suggest filtering with first and second low-pass filter transfer functions as defined in claim 22 (i.e., “modifying the output to produce a modified output, wherein the modifying of the output comprises filtering past errors in accordance with a first low-pass filter transfer function and incorporating into the modified output the past errors filtered in accordance with the first low-pass filter transfer function, and subtracting the modified input from the modified output to produce a second error value filtering the second error value in accordance with a second low-pass filter transfer function to produce the first error value”). Instead, both Kumar and Shimizu disclose a single lowpass filter (see error filter in FIG. 1 of Kumar and error diffusion filter means 230 in FIG. 2 of Shimizu) serving the same function in the feedback path (i.e., filtering the difference between the output and the modified input). There is no disclosure in Kumar or Shimizu that would have given one skilled in the art any apparent reason to modify Kumar to filter “past errors in accordance with a first low-pass filter transfer function and incorporating into the modified output the past errors filtered in accordance with the first low-pass filter transfer function.”

It is noted that the Examiner has not attempted to respond to Appellant's explanation on page 14 of the Appeal Brief that the weight coefficient adjustment means 280 is not a lowpass filter; instead, it adjusts the output of the error diffusion filter means 230 (see col. 6, lines 26-38, of Shimizu). Apparently, the Examiner has conceded this point

B. Claims 12, 15, 16, 19-20, and 24

Each of claims 12, 15, 16, 19-20, and 24 is patentable over Kumar in view of Shimizu for at least the same reasons explained above in connection with independent claim 1 and on page 14 of the Appeal Brief.

IV. Conclusion

For the reasons explained above, all of the pending claims are now in condition for allowance and should be allowed.

Charge any excess fees or apply any credits to Deposit Account No. 08-2025

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Respectfully submitted,

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